Chapter 6. ANALYSIS OF ALTERNATIVES

The Department recommends that the Commission adopt regulations that will provide for and control the commercial harvest of Pacific herring. An array of regulations (Section 163 and 164, Title 14, CCR presented in Appendix 1) has evolved to provide for the efficient harvest and orderly conduct of herring fisheries [Sec 3.2.4]. The proposed project reflects both Department and public recommendations for continuation, amendment, or change to existing regulations to meet the State's policy for managing the herring resource. However, three regulatory alternatives are also provided for consideration.

The three commercial harvest alternatives were selected for consideration by the Commission based on public comment received during the normal review process, or in response to the Notice of Preparation (NOP). These alternatives were selected to provide the Commission with a range of commercial harvest alternatives. All commercial harvest alternatives contain common elements with only selected elements of the management framework considered as alternatives. A "no project" (no commercial harvest of herring) alternative is also provided.

The potential environmental impacts associated with each alternative will be assessed below. The project alternatives section of Chapter 2 provides a brief overview of the unique regulation characteristics associated with each alternative and a description of the problem or condition that the regulation change is intended to address.

6.1 Alternative 1 (no project)

The "no project" alternative would eliminate commercial harvest from the Pacific herring resource management framework. Selection of this alternative would be expected to: 1) reduce total mortality and allow herring stocks to increase to carrying capacity; 2) reduce the health of stocks through density dependent intraspecific interactions; 3) increase interspecific competition and reduce standing crops of closely related species; 4) increase the availability of herring to predators by reducing search effort and increasing capture success; 5) eliminate the ethical concern of those opposed to the commercial harvest of herring; 6) eliminate the scientific information on herring derived from sampling the commercial harvest; 7) eliminate revenues to local and regional economies and State and Federal agencies derived from the commercial harvest of herring.

Localized, short-term, and less than significant impacts to traffic circulation, water quality, air quality, housing, utilities, scenic quality, recreational opportunities, and noise levels would be eliminated.

The potential biological impacts associated with a "no project" alternative include an increased rate of natural mortality. The sources of natural mortality and mortality rates typically vary with the age of fish within a population (Sec 3.2.1.8]. This is particularly true when all life stages are considered (egg, larvae, juvenile, and adult).

Natural mortality of eggs may increase with population size, if population size influences egg deposition density and assuming limits exist on suitable spawning habitat. The number of egg layers affects hatching success [Sec 3.2.1.3]. The optimal number of layers varies with depth, but, hatching success tends to decrease when egg deposition exceeds medium densities.

Natural mortality may or may not increase due to increased predation by various marine fish, bird, and mammal species that consume herring, as predation would likely increase in proportion to herring population levels.

Increases in the standing crop of herring could have negative impacts on those species that

compete with herring [Sec 3.2.1.10]. Competitors include other pelagic schooling fish with overlapping spatial distribution, juvenile and subadult coho salmon in shallow sublittoral habitat, and a variety of zooplankton. Other than competition with pelagic schooling species, most of the competition will likely have only localized effects. Competition among pelagic schooling fish can contribute to large shifts in relative abundance [Sec 5.3]. However, the mechanisms involved in these competitive interactions are not well understood, thus limiting any predictive capability in this assessment.

Although not an environmental impact, the no project alternative has potential negative socio-economic impacts. For example, approximately 470 permittees and at least that many crew members derive income, in some cases a significant proportion of their annual income, from the herring fishery. That income would have to be obtained from other endeavors should the herring fisheries be precluded by selection of this alternative. A rough estimate of the gross income to the fishermen (ex-vessel income) provided by the San Francisco Bay herring roe fishery during the 1992-93 season was four million dollars generated over a relatively short fishing season (3 months) with a relatively low cost structure.

No study of herring roe fishery economics has been done. However, several generalizations can be made to place the economic impacts of a "no project" alternative into perspective. Value to the local economy would be roughly twice the amount paid to the fisherman (Ed Ueber, NMFS, pers. comm). Value to the national economy would be greater because fishery products in general have a large positive contribution to our balance of trade. Herring roe products are almost entirely exported. As a result, almost the entire value benefits the balance of trade.

6.2 Alternative 2 (existing regulations)

In most regards, the environmental impacts of all the alternatives that provide for the commercial harvest of herring will be similar to those of the proposed project. Impact assessments of the alternatives will focus on those elements that differ from the proposed project.

In alternative 2, the only amendments proposed are those that adjust seasons to the current calendar and quotas by current biomass estimates. The impact assessment for the proposed project applies to these changes [Sec 4.2].

However, adopting regulations as they exist does not address problems or conditions addressed by the changes and amendments in the proposed project. Some of the changes and amendments in the proposed project address harvest rates, notification and/or administrative issues, efficiency issues, eggs on kelp fishery issues, or are simply clarification changes and are without apparent environmental implications.

Those changes or amendments that do have environmental implications include the quota alternatives for San Francisco Bay and Tomales Bay. The environmental implications of quota changes are almost entirely biological in nature.

6.3 Alternative 3 (individual vessel quota)

This alternative modifies alternative 2 by establishing individual boat quotas for the herring roe gill net fishery in San Francisco Bay. The individual boat quotas would be established in a manner comparable to that used to establish individual boat quotas for the round haul fishery. Although largely an economic issue, providing for individual boat quotas in the herring roe gill net fishery does have some subtle environmental implications.

Localized, short-term, and less than significant impacts of this alternative to traffic circulation, water quality, air quality, housing, utilities, scenic quality, recreational opportunities, and noise levels are expected to be comparable to the proposed project. However, fishing effort could

extend further into the season since the economic incentive would direct effort toward higher quality rather than quantity. In this regard, without individual boat quotas, overall quotas have typically been met long before season closure. Having the latitude to strive for higher quality could add incrementally to most impacts. Daily pollution emissions, for example, may occur on a greater number of days than has occurred in the past if more effort was spent in search of fish with high roe content.

No data are available to quantitatively assess the potential impacts of individual boat quotas from a biological perspective. Individual boat quotas for the herring roe gill net fishery in San Francisco Bay (this alternative) could have potential negative biological impacts. These impacts would result from having the time and incentive to sort and discard males and immature females to maximize landings value. Landings with higher roe content bring higher prices. There would also be greater incentive to discard entire gill net catches of lower quality (low roe content) and also increase the opportunity to make unreported landings. As a result, true fishing mortality would be underestimated by actual landings. The potential impacts of this type of practice have been discussed [Sec 4.2.6].

With no individual boat quotas, the biological impacts will result from the tendency to land as much fish as quickly as possible. More nets than are legally provided for could be set and more nets lost. Potential impacts from "ghost" nets are more likely under this scenario [Sec 4.2.6]. There is also an incentive to fish gill nets with smaller mesh than provided for legally. This puts greater pressure on age classes that have had fewer opportunities to reproduce. Long-term stability could be affected if that pressure results in establishing a narrow age structure in the population.